FIG. 1

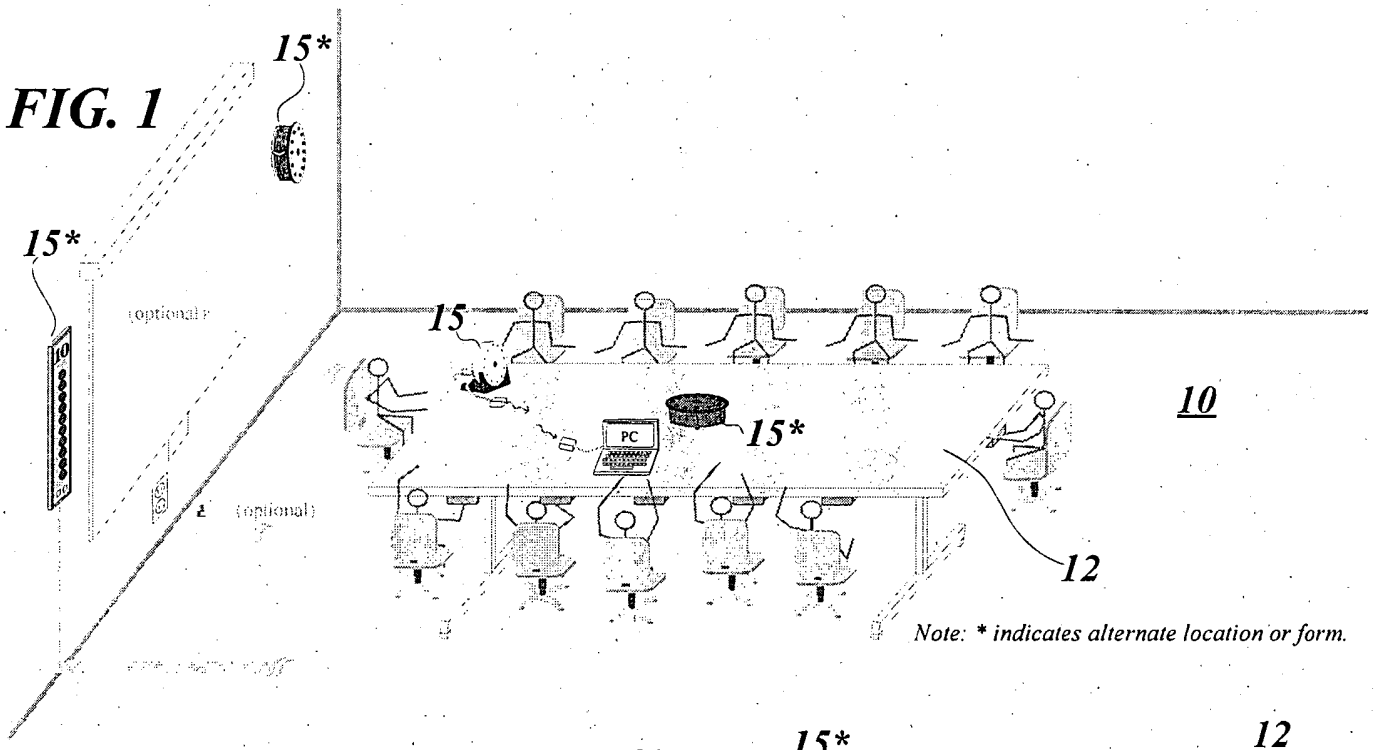


FIG. 2

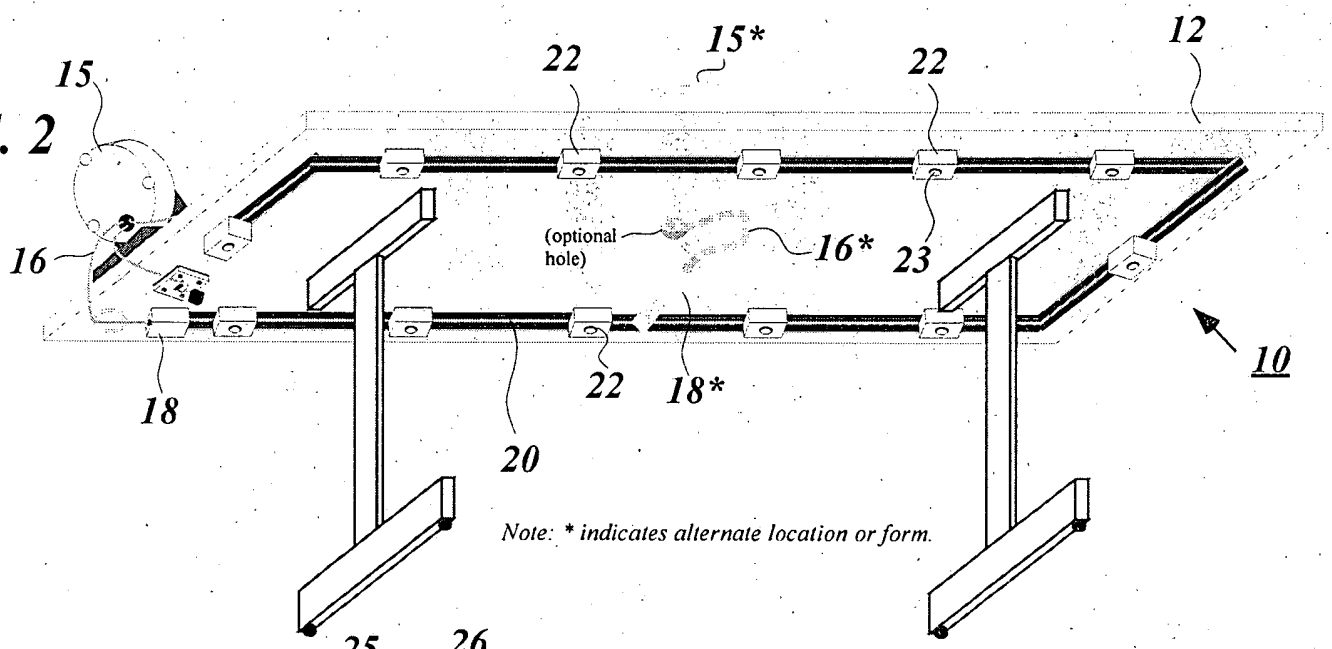
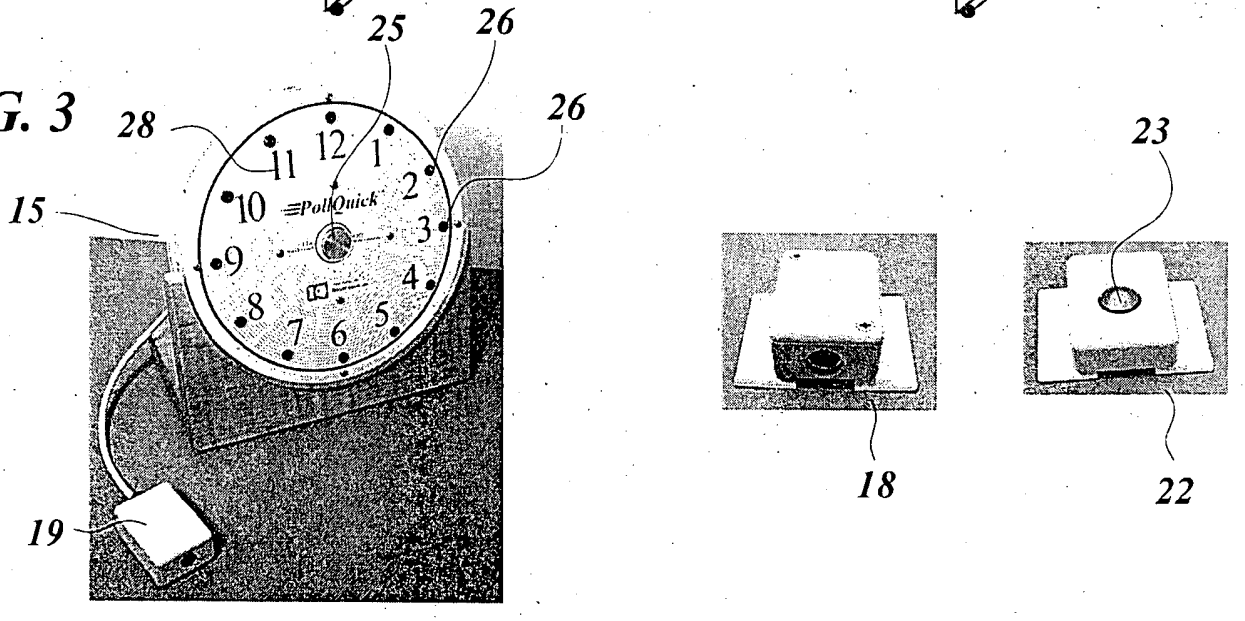


FIG. 3



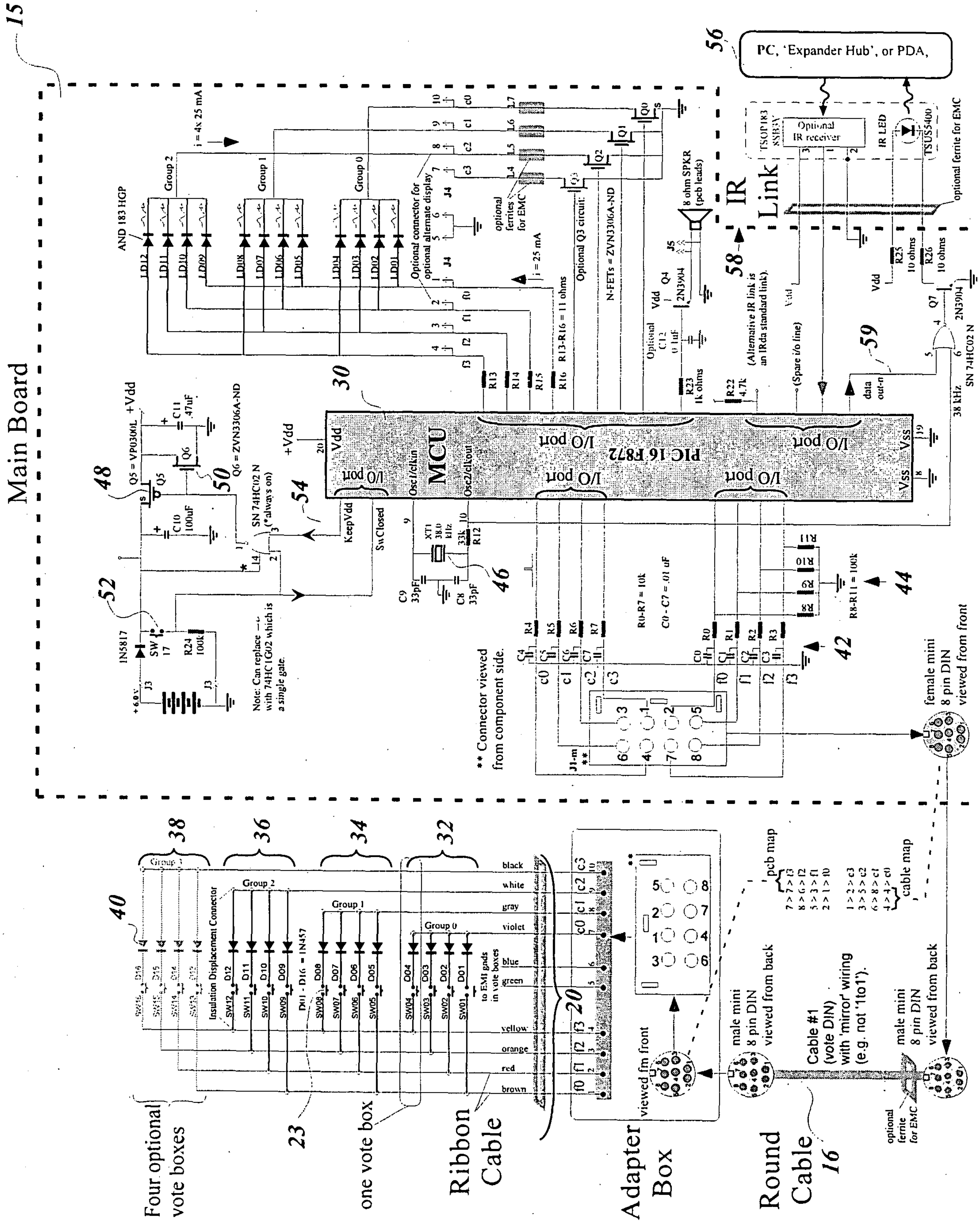

15
Main Board
PC, 'Expander Hub', or PDA,
56
IR Link
58
Optional IR receiver
IR LED
TSUS5400
optional ferrite for EMC
R25 10 ohms
R26 10 ohms
2N3904
Q7
SN 74HC02 N
59
38 kHz
data out-n
(Spare i/o line)
(Alternative IR link is an IRda standard link).
R22 4.7k
R23 1k ohms
8 ohm SPKR (pcb leads)
J5
Q4 2N3904
N-FETs = ZVN3306A-ND
Optional Q3 circuit
R13-R16 = 11 ohms
i = 25 mA
i = 4x 25 mA
optional ferrites for EMC
Optional connector for optional alternate display
J4
Group 0
Group 1
Group 2
AND 183 HGP
30
MCU
PIC 16 F872
I/O port
Osc1/clkin
Osc2/clkout
Vdd
Vss
+Vdd
KeepVdd
SwClosed
48
50
52
54
Q5 = VP0300L
Q6 = ZVN3306A-ND
C11 47uF
C10 100uF
SN 74HC02 N (*always on)
1N5817
SW 17
R24 100k
+6.0V
J3
Note: Can replace with 74HC1G02 which is a single gate.
XT1 38.0 kHz
R12 33k
C9 33pF
C8 33pF
46
R0-R7 = 10k
C0 - C7 = .01 uF
R8-R11 = 100k
44
42
** Connector viewed from component side.
J1-m
female mini 8 pin DIN viewed from front
38
36
34
32
40
Group 3
Group 2
Group 1
Group 0
Insulation Displacement Connector
D01 - D16 = 1N457
to EMI pads in vote boxes
black
white
gray
violet
blue
green
yellow
orange
red
brown
20
pcb map
cable map
viewed fm front
male mini 8 pin DIN viewed from back
Cable #1 (vote DIN) with 'mirror' wiring (e.g. not '1to1').
optional ferrite for EMC
Four optional vote boxes
23
one vote box
Ribbon Cable
Adapter Box
Round Cable
16

FIG. 4A

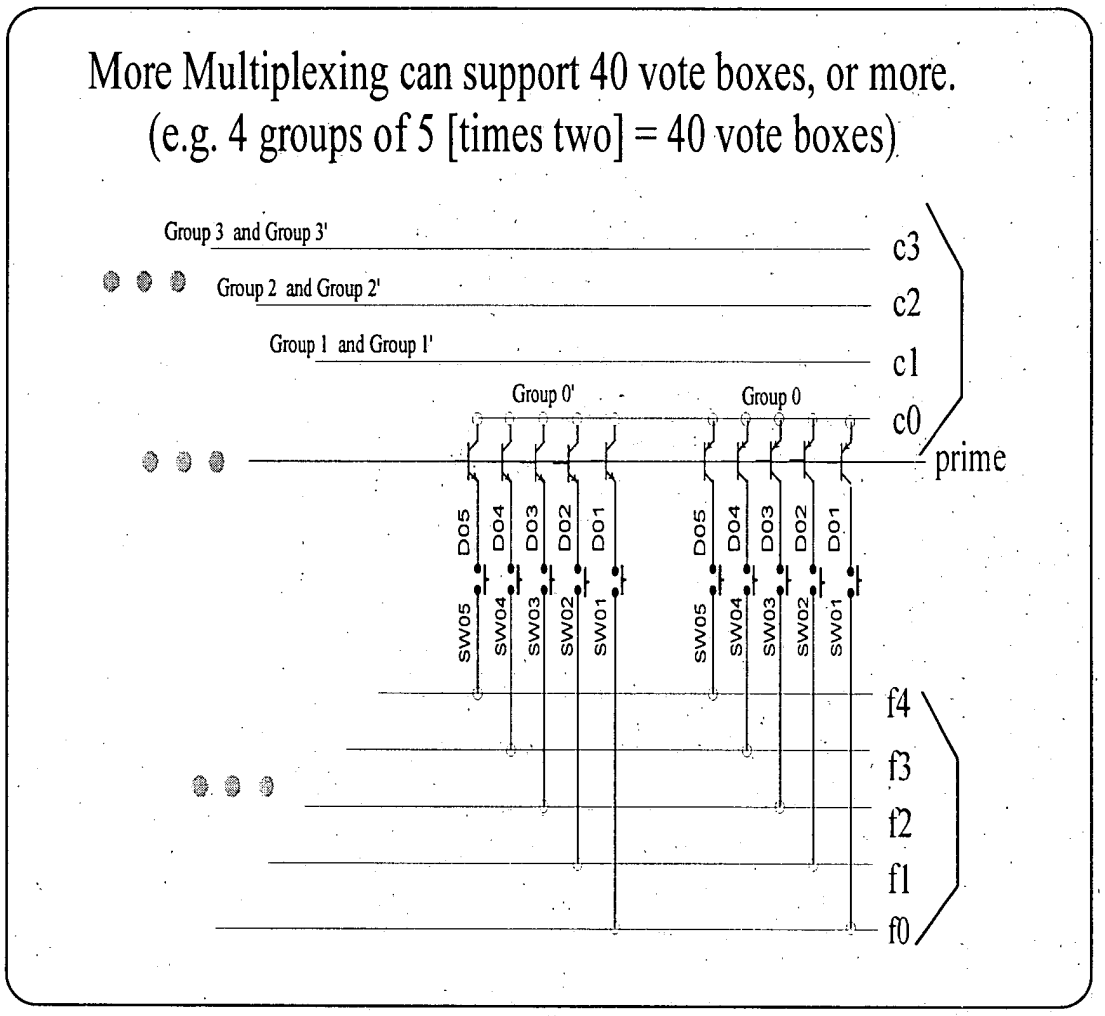

More Multiplexing can support 40 vote boxes, or more.
(e.g. 4 groups of 5 [times two] = 40 vote boxes)
Group 3 and Group 3'
Group 2 and Group 2'
Group 1 and Group 1'
Group 0'
Group 0
c3
c2
c1
c0
prime
D05
D04
D03
D02
D01
SW05
SW04
SW03
SW02
SW01
f4
f3
f2
f1
f0

FIG. 4B

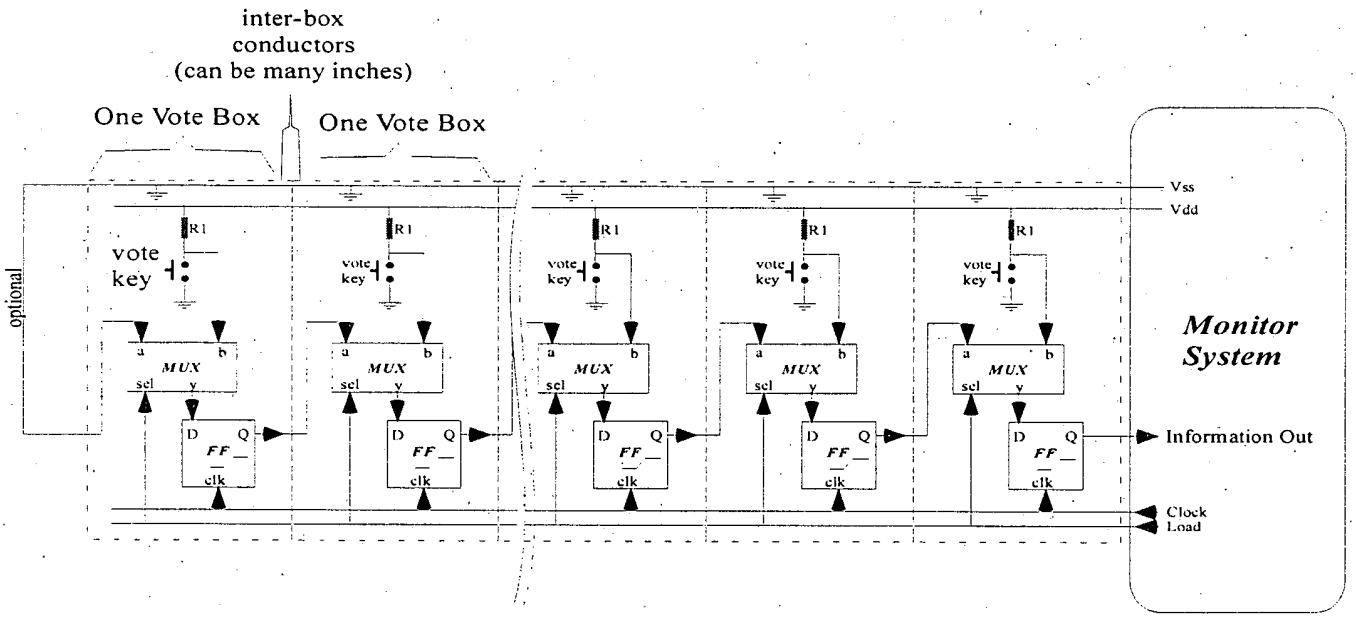
A Shift Register Version

Pros:

1. Can extend to large number of (identical) vote boxes.
2. All vote boxes are identical.
3. Data out (each Q) drives only small loads.

Cons:

1. Logic (ICs) required in each vote box.
2. Power (Vdd, Vss) must be supplied to the ICs.
3. More than 2 contacts per votebox are critical.
4. The clock drives multiple loads (unless made asynchronous).
5. Slow data out for given clock frequency (unless parallel paths used. See 3 below).
6. More FCC noise issues.
7. Press-on tool is more complicated (added cutting mechanism) since one or more conductors must be segmented.



Note: Simple refinements are possible:

1. We can supply Vdd (for FF & Mux) via the clock (rectified & LP filtered).
2. We can reduce the number of inter-box conductors by encoding "load" (for example) on other conductors. Even just 2 conductors can suffice.
3. More conductors can be used to simultaneously send several bits.
4. A 'counters with digital comparitors' approach could replace the 'shift register' (above) approach.

FIG. 4C

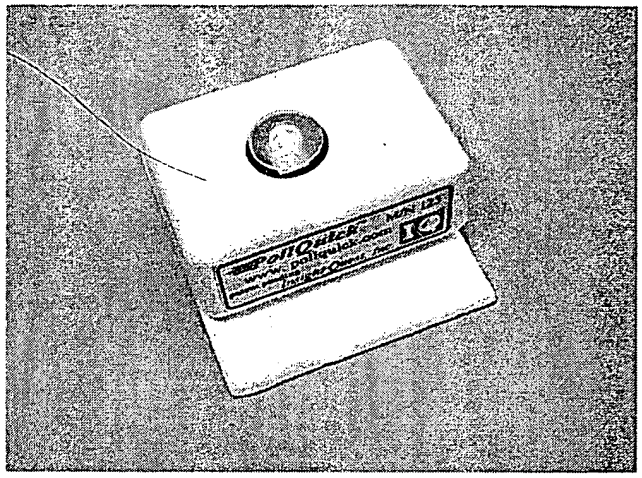


FIG. 5

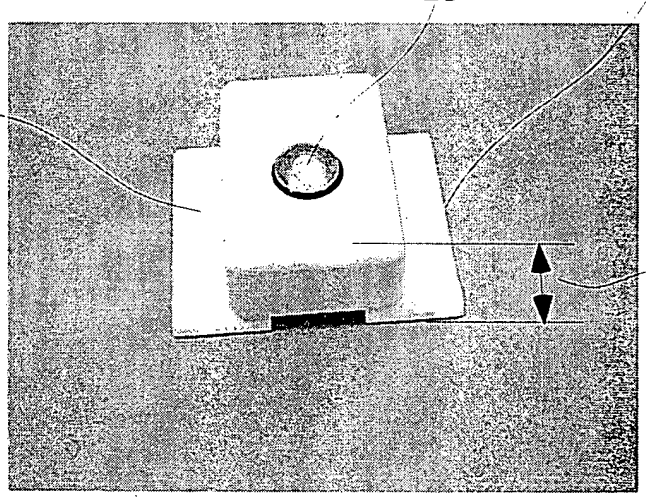


FIG. 6

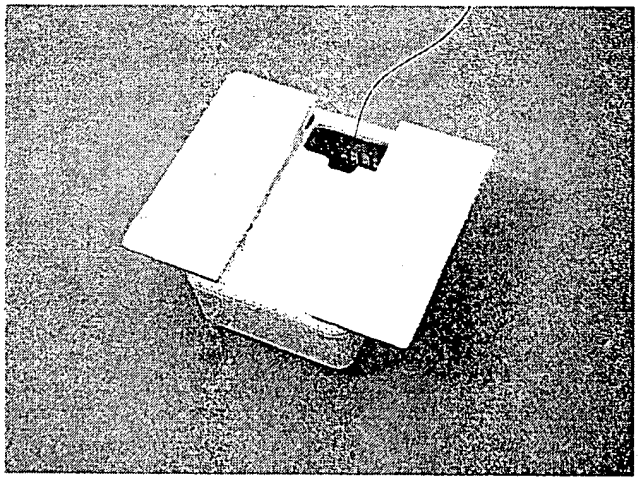


FIG. 7

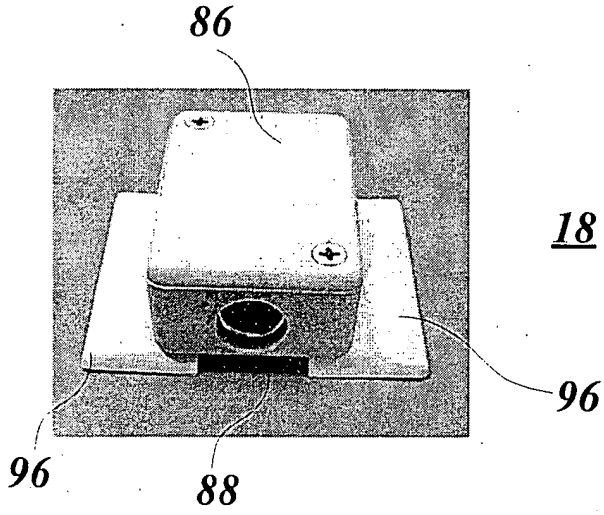


FIG. 8

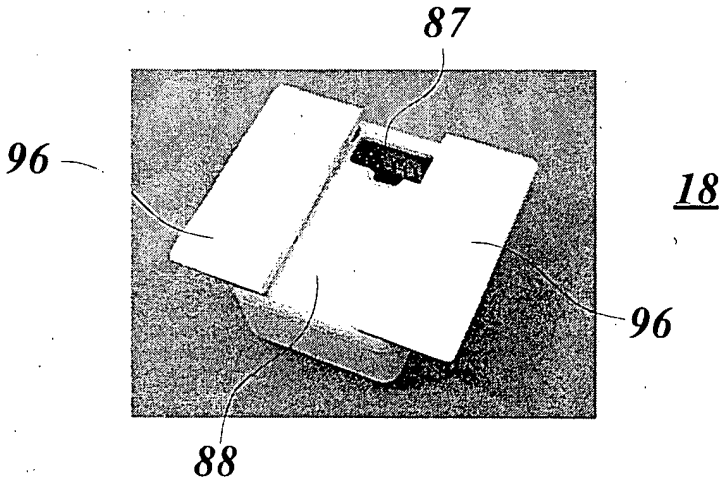


FIG. 9

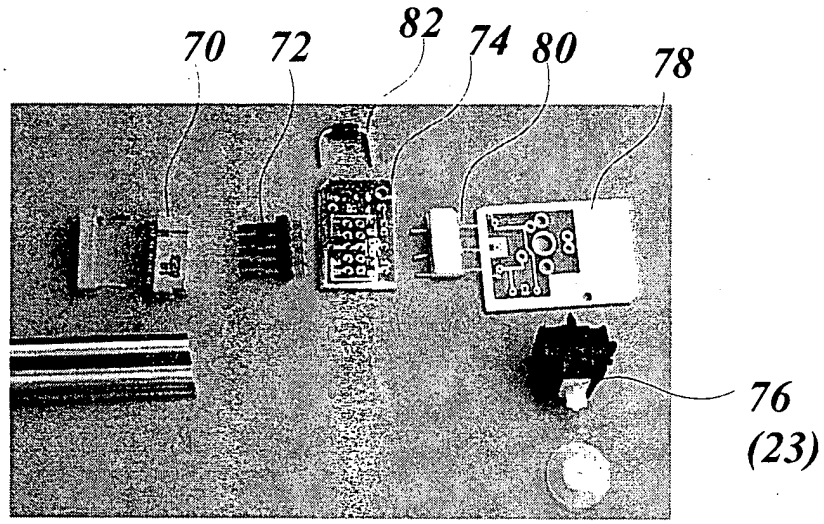


FIG. 10

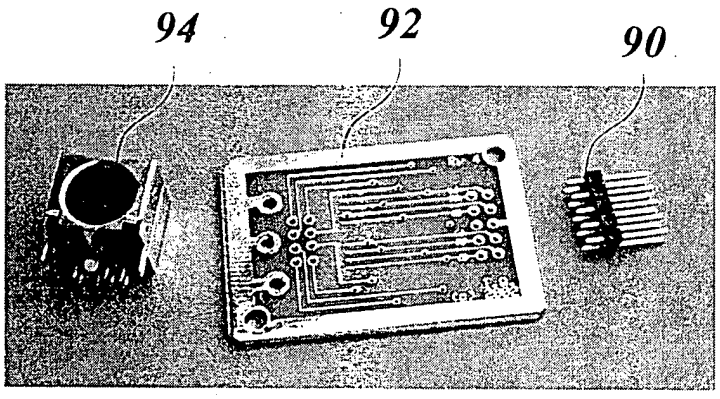


FIG. 11

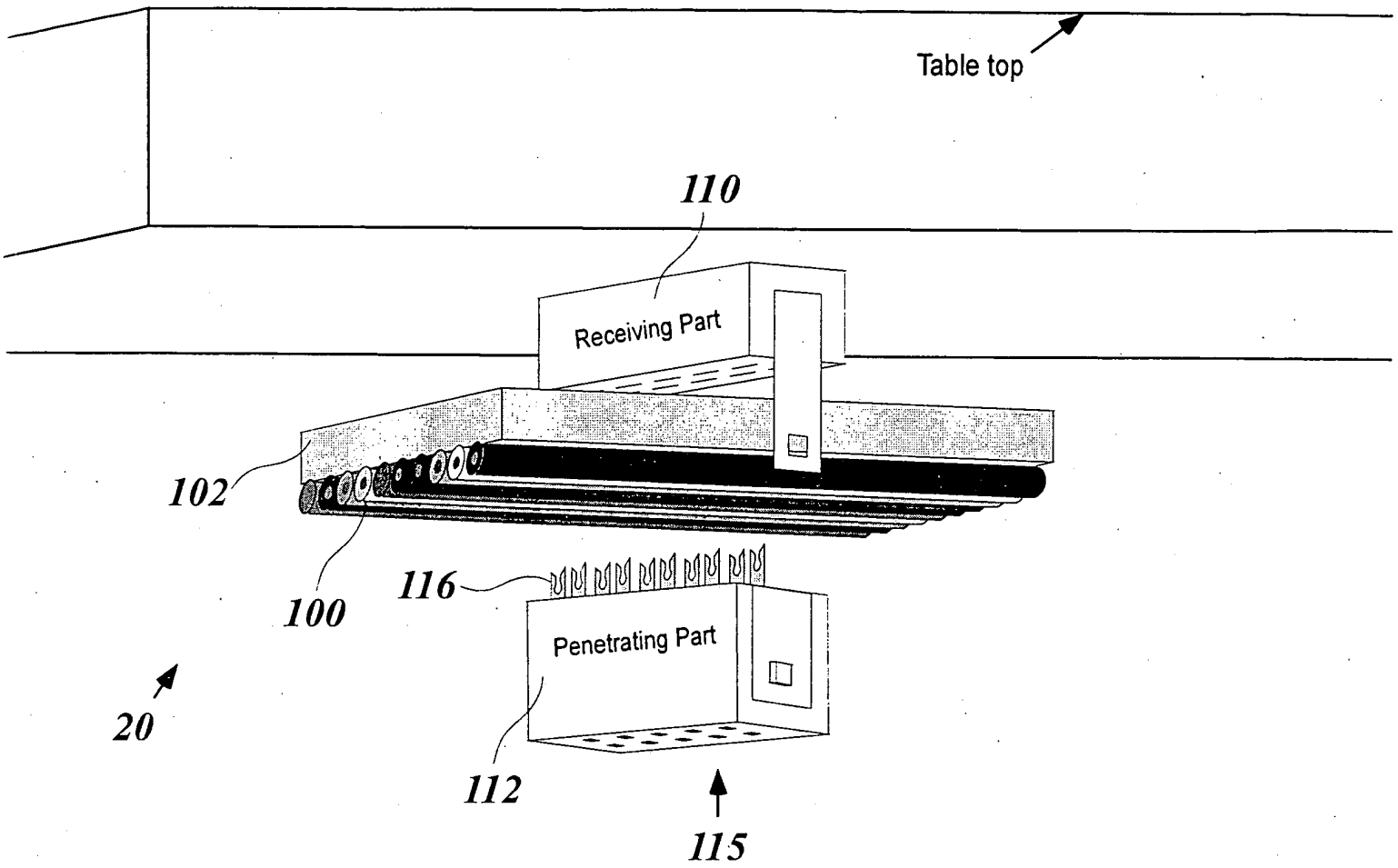


Table top
110
Receiving Part
102
100
116
Penetrating Part
20
112
115

FIG. 12

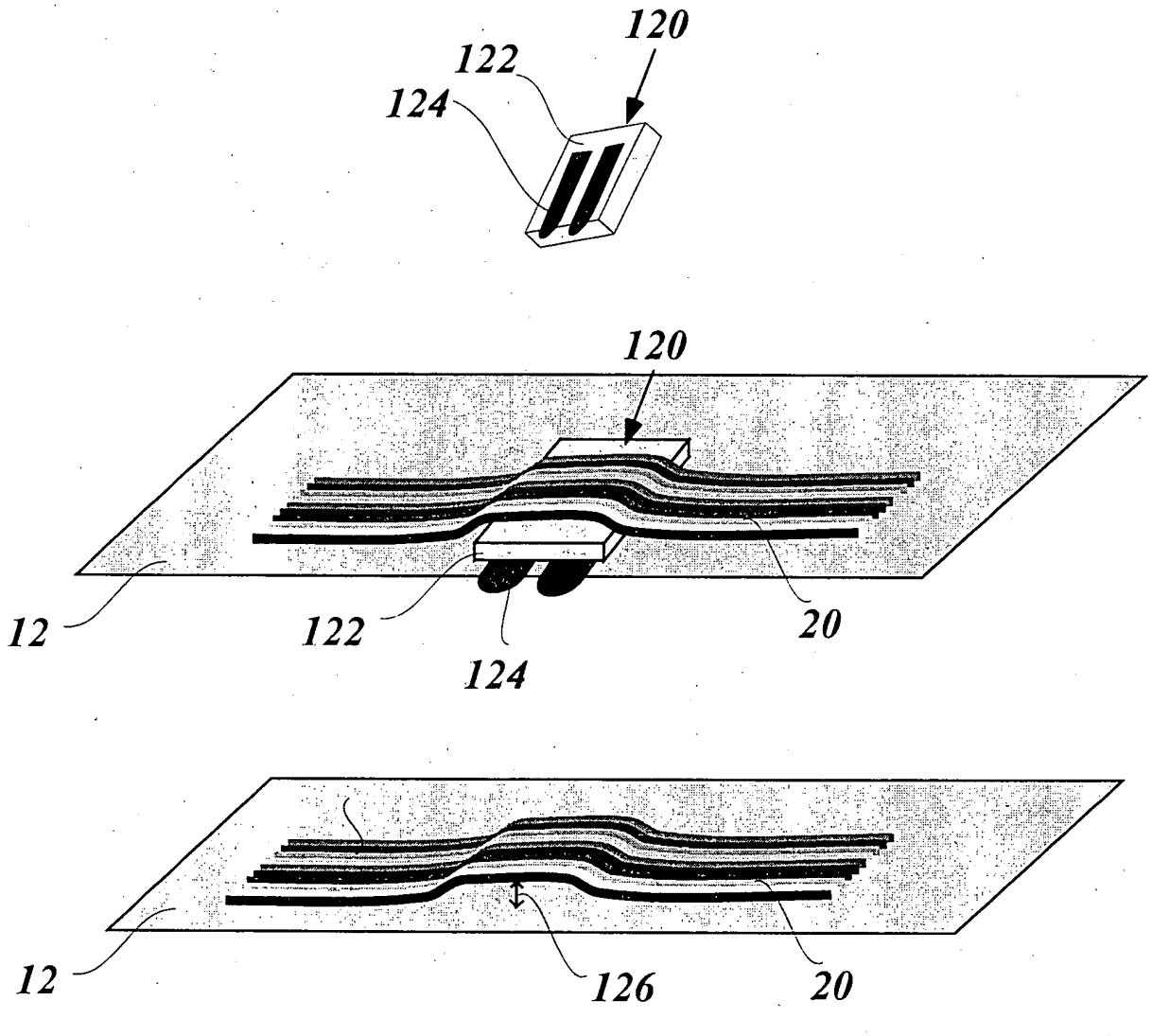


FIG. 13

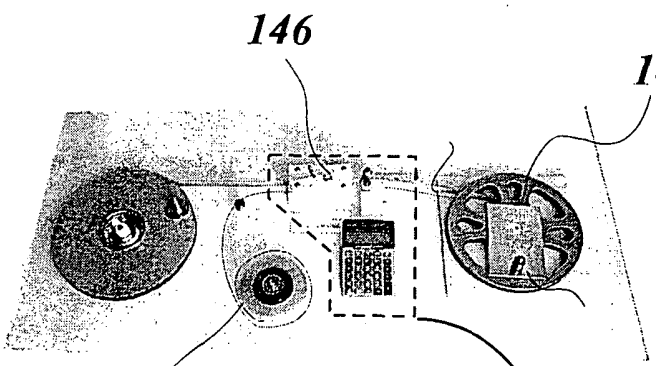


FIG. 14

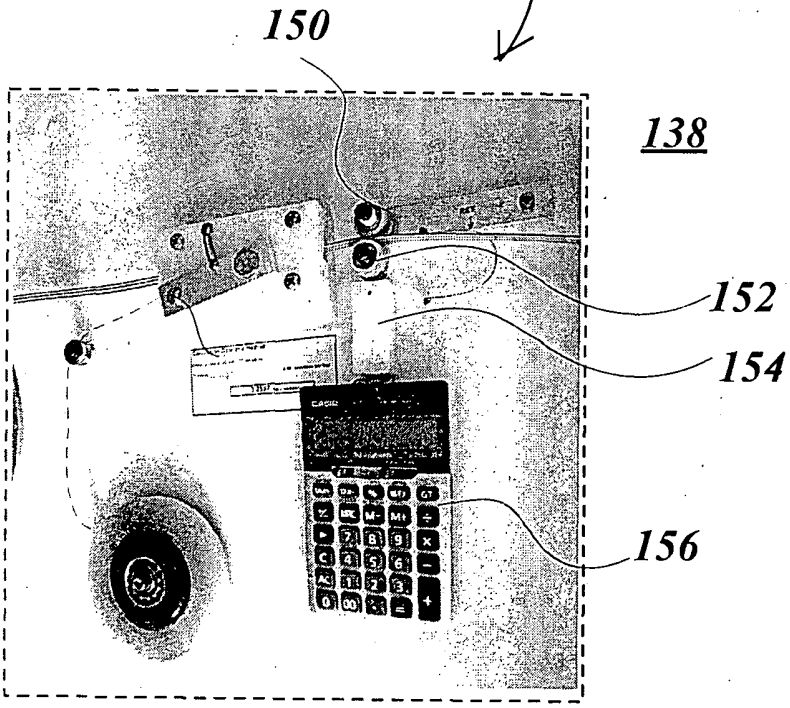


FIG. 15